



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(51) International Patent Classification <sup>6</sup> :</b><br><b>D06N 3/12, D06M 15/643, B60R 21/16,</b><br><b>C09D 5/33</b>  | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 98/30748</b><br><b>(43) International Publication Date:</b> 16 July 1998 (16.07.98)  |
| <b>(21) International Application Number:</b> PCT/SE97/01634<br><b>(22) International Filing Date:</b> 29 September 1997 (29.09.97)<br><b>(30) Priority Data:</b><br>9604661-0 19 December 1996 (19.12.96) SE<br><b>(71) Applicant (for all designated States except US):</b> FOV FABRICS AB [SE/SE]; P.O. Box 165, S-501 04 Borås (SE).<br><b>(72) Inventors; and</b><br><b>(75) Inventors/Applicants (for US only):</b> LÖNGÅRDH, Gunnar [SE/SE]; Grudegatan 10, S-507 45 Borås (SE). JOHANSSON, Mats [SE/SE]; Söråsen, S-516 96 Apledare (SE).<br><b>(74) Agent:</b> AWAPATENT AB; P.O. Box 11394, S-404 28 Göteborg (SE). |           | <b>(81) Designated States:</b> AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i><br><i>In English translation (filed in Swedish).</i> |
| <b>(54) Title:</b> WOVEN FABRIC FOR AIR BAGS IN VEHICLES<br><br><b>(57) Abstract</b><br><br><p>The invention relates to a fabric which is made from a synthetic fibre, preferably polyamide, and which constitutes a cloth possessing high tensile and tear strengths and intended to be used as the material of impact-protective, inflatable air bags utilised in motor vehicles. The fabric face forming the inner face of the air bag has a coating applied thereon. The coating consists of one or several layers of polymer with admixture thereto of a pigment having heat-reflecting properties.</p>                  |           |  |

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## WOVEN FABRIC FOR AIR BAGS IN VEHICLES

The invention relates to a fabric which is made from a synthetic fibre, preferably polyamide, and which constitutes a cloth possessing high tensile and tear strengths. The cloth is intended to be used as the material of impact-protective, inflatable air bags  
5 utilised in motor vehicles.

Various techniques are known to produce rapid inflation of an air bag utilised in motor vehicles. It is essential that gas fills the air bag extremely quickly to allow the bag sufficient time to inflate into a satisfactory impact protection means in an imminent crash situation. For example, an air bag stored in deflated condition in the hub of the vehicle steering-wheel must be filled in 30-40 msec in the case of a head-on collision. Air bags stored in deflated condition laterally of a vehicle seat or in a vehicle door must be filled at an even higher rate.  
10  
15

In accordance with one prior-art solution, a gas generator is used of a kind comprising a propellant which upon ignition rapidly develops a hot, air-bag inflating gas. The substance generally used is sodium azide ( $\text{NaN}_3$ ), which forms nitrogen gas ( $\text{N}_2$ ).  
20

The advantage of this substance is that it develops large quantities of gas in a brief space of time. A disadvantage is, however, that sodium azide is a toxic substance.  
25

For this reason various substances have been tested in order to find another suitable gas generator which while likewise developing large quantities of gas upon ignition is non-toxic. The tested propellants have, however, proved to develop gases that are even hotter than the above, well established sodium azide. Hotter gases do, however, risk to burst the air bag because they may cause fusion damages to the air bag fabric.  
30

Tests have also been carried out with a so-called hybrid generator, which is a gas cartridge containing pressurised gas (argon), a gas which is not hot when gushing out of the air bag. However, other disadvantages  
5 are connected with this solution. The gas cartridge is a pressurised vessel and as such submitted to specific restrictions, and occupies comparatively large space, for example in the module of a vehicle steering-wheel.

The invention provides a fabric by means of which  
10 all problems referred to above are solved. The characteristic feature of the invention is that the fabric face forming the inner face of the air bag has a coating applied thereon. The coating consists of one or several layers of polymer with admixture thereto of a pigment  
15 having heat-reflecting properties. A suitable coating for this purpose has been found to be a silicone elastomer with admixture thereto of an aluminium paste or aluminium pigments.

Measurements have been performed on non-coated fabrics, fabrics coated with paste having coloured pigments  
20 admixed therewith, and fabrics coated with aluminium pigments. These measurements have shown that the non-coated fabric and a coated fabric of the first-mentioned kind possess the same heat-reflection index whereas in  
25 the fabric of the last-mentioned kind the heat losses through thermal reflection from the aluminium-coated surface is reduced by 10%. In conformity with the general law on gases, this results in a higher pressure inside the air bag.

30 The indicated value of reduced heat losses has been established by means of a method for determining the heat insulating properties of fabrics in accordance with ISO 5085-1:1989, known as the single plate method. Measurements were carried out on a fabric sample mounted on a  
35 spacer ring, with the aluminium-coated surface facing downwards, towards a heated measurement plate and spaced 15 mm from the plate. The environmental climate condi-

tions were as follows: temperature 20°, relative humidity 65%, air velocity 0.5 m/s.

The invention provides several important advantages. The fabric may be thin, yet strong at the same time, and  
5 therefore requires only a small space inside the module. A fabric with said coating applied thereon is able to resist also high-temperature gases. Consequently, a propellant may be used that develops a higher-temperature gas than does sodium azide but that is non-toxic, and  
10 this without involving risks for fusion damages to the fabric.

As already mentioned, the thermal reflection increases the pressure inside the bag. As a result, the power of the gas generator may be reduced and a smaller  
15 amount of propellant need be used. In consequence thereof, the air bag is exposed to less stress while at the same time cost savings are made.

Obviously some other coating substance than the one referred to above is conceivable, provided it possesses  
20 the characteristic of having heat-reflecting properties.

## CLAIMS

1. A fabric which is made from a synthetic fibre,  
preferably polyamide, and which constitutes a cloth  
5 possessing high tensile and tear strengths and intended  
to be used as the material of impact-protective in-  
flatable air bags utilised in motor vehicles, c h a r-  
a c t e r i s e d in that the fabric face forming the  
inner face of the air bag has a coating applied thereon,  
10 said coating consisting of one or several layers of  
polymer with admixture thereto of a pigment having heat-  
reflecting properties.

2. A fabric as claimed in claim 1, c h a r a c-  
t e r i s e d in that the coating consists of a silicone  
15 elastomer with admixture thereto of an aluminium paste or  
an aluminium pigment.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/01634

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: D06N 3/12, D06M 15/643, B60R 21/16, C09D 5/33

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B60R, D06N, D06M, D03D, C09D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A         | WO 9605360 A1 (TYGAFLOL LIMITED), 22 February 1996<br>(22.02.96)<br>--             | 1-2                   |
| A         | EP 0384995 A1 (TEXTILVER S.A.), 5 Sept 1990<br>(05.09.90)<br>--                    | 1-2                   |
| A         | EP 0702106 A1 (TAKATA CORPORATION), 20 March 1996<br>(20.03.96)<br>--              | 1-2                   |
| A         | EP 0712956 A1 (TOSHIBA SILICONE CO., LTD.),<br>22 May 1996 (22.05.96)<br>--        | 1-2                   |

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Name and mailing address of the ISA/  
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Box 5055, S-102 42 STOCKHOLM  
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Authorized officer

Monika Bohlin

Telephone No. +46 8 782 25 00

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                   | Relevant to claim No. |
|-----------|--|-----------------------|
| A         | <p>US 5208097 A (HIROSHI HONMA ET AL), 4 May 1993<br/>(04.05.93)</p> <p style="text-align: center;">--<br/>-----</p> | 1-2                   |

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/97

International application No.

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| Patent document<br>cited in search report |         |    | Publication<br>date | Patent family<br>member(s)                        | Publication<br>date              |
|---|---------|----|---------------------|---|----------------------------------|
| WO  | 9605360 | A1 | 22/02/96            | AU 3186095 A<br>EP 0775230 A<br>GB 9416076 D      | 07/03/96<br>28/05/97<br>00/00/00 |
| EP  | 0384995 | A1 | 05/09/90            | DE 68911669 D,T<br>GB 2225544 A,B<br>US 5014753 A | 19/05/94<br>06/06/90<br>14/05/91 |
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| EP  | 0712956 | A1 | 22/05/96            | JP 8134394 A                                      | 28/05/96                         |
| US  | 5208097 | A  | 04/05/93            | JP 6041874 A                                      | 15/02/94                         |

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